# Presentation Techniques

This article presents examples of seven types of diagrams commonly called for in the course of documenting an architectural description. If composed with discretion, such diagrams can be of tremendous benefit in representing multiple concepts in a clean and simple manner. Graphics tend to attract attention and excite interest. Most people get more from a picture than they do from text or from model-based documents.

The presentations collected here are intended to help bring the novice architect up to speed quickly with respect to potential ways of representing data and building architectural descriptions that are consistent with the principles outlined by DoDAF 2.0. Note, however, that 2.0 itself mandates neither specific diagram formats nor content for such diagrams, nor the tool(s) to be used in creating or storing them. "DoDAF-described Models" are just that – models documented by means of diagrams that DoDAF 2.0 *describes,* but does not compel with respect to number, style, or level of detail. And the creators of *Fit-for-Purpose Views* – i.e., project architects –enjoy an even greater degree of freedom in creating those deliverables.

**Table 1: DoDAF-Described Models by Presentation Category**

| Category / VP | Tabular | Structural | Behavioral | Mapping | Taxonomy | Pictorial | Timeline |
|---|---|---|---|---|---|---|---|
| All Viewpoint | AV-1 | | | | AV-2 | | |
| Capability | CV-1 | CV-4 | | CV-6<br>CV-7 | CV-2 | | CV-3<br>CV-5 |
| Operational | OV-3 | OV-2<br>OV-4 | OV-6a<br>OV-6b<br>OV-6c | | OV-5 | OV-1 | |
| System | SV-6<br>SV-7<br>SV-9 | SV-1<br>SV-2 | SV-4<br>SV-10a<br>SV-10b<br>SV-10c | SV-3<br>SV-5a<br>SV-5b | | | SV-8 |
| Standards | StdV-1<br>StdV-2 | | | | | | |
| Data and Information | | DIV-1<br>DIV-2<br>DIV-3 | | | | | |
| Service | SvcV-6<br>SvcV-7<br>SvcV-9 | SvcV-1<br>SvcV-2 | SvcV-4<br>SvcV-10a<br>SvcV-10b<br>SvcV-10c | SvcV-3a<br>SvcV-3b<br>SvcV-5 | | | SvcV-8 |
| Project | | PV-1 | | PV-3 | | | PV-2 |

- *Tabular*: Models which present data arranged in rows and columns, and may as a special case include structured text.
- *Structural*: Diagrams describing primarily how the elements depicted in an architecture are arranged/put together/interface.

- *Behavioral*: Diagrams which describe primarily the dynamic behaviors of the elements depicted in an architecture.
- *Mapping*: These models provide matrix (or similar) mappings between different types of information/other models.
- *Taxonomy*: Models which extend the DoDAF ontology for a particular architecture. They introduce and define terms and data relationships specific to the architecture description at hand, and show how those terms relate to the data categories already found in the DoDAF Metamodel (DM2).
- *Pictorial*: This category consists of free-form pictures.
- *Timeline*: This category comprises diagrams describing the programmatic aspects of an architecture – e.g. general timelines, capability acquisition milestones, and system evolution.

## 1. TABULAR PRESENTATIONS

The following is an example of a tabular presentation, create using MSWord. This table happens to show how the architectural description allocates selected operational activities t o various blocks in a block diagram (structural presentation: see 2., below).

Process/Activity
(Verbs)

Performer
(Nouns)

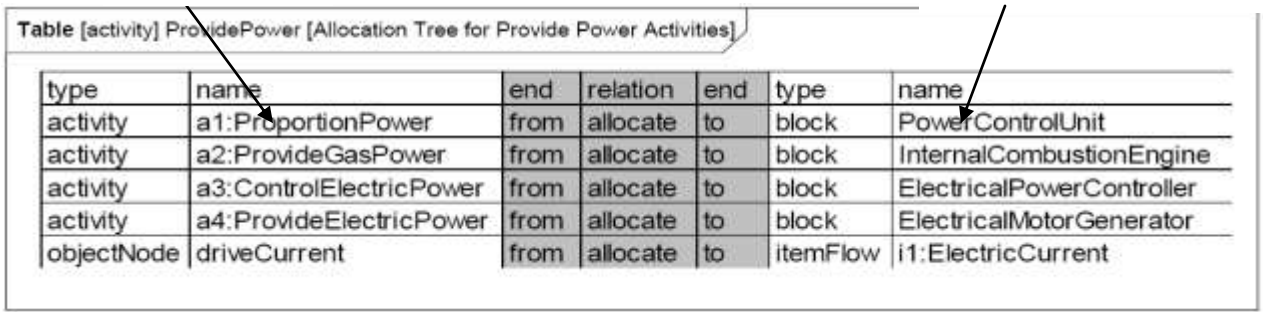

**Table** [activity] ProvidePower [Allocation Tree for Provide Power Activities]

| type | name | end | relation | end | type | name |
|---|---|---|---|---|---|---|
| activity | a1:ProportionPower | from | allocate | to | block | PowerControlUnit |
| activity | a2:ProvideGasPower | from | allocate | to | block | InternalCombustionEngine |
| activity | a3:ControlElectricPower | from | allocate | to | block | ElectricalPowerController |
| activity | a4:ProvideElectricPower | from | allocate | to | block | ElectricalMotorGenerator |
| objectNode | driveCurrent | from | allocate | to | itemFlow | i1:ElectricCurrent |

**Figure 1: A Table Showing Allocation**

What follows is another example of a Tabular view – a portion of a notional System Performance Parameters Matrix (SV-7) prepared by the JTEM [[EXPAND]]. SV-7s like this may support the conduct

of net-centric capability assessments for the test and evaluation (T&E) and other analysis communities:

| MOE Decomposition | | | | | Measure Range (Threshold and Objective Measures) | | Associated Measures (MOE, MOP, KPP) |
|---|---|---|---|---|---|---|---|
| Effect No. | MOE Name | MOE Identifier | Sub-MOE Description | Data Element | $Time_0$ - Baseline Architecture | $Time_n$ - Target Architecture | |
| Effect 1 | Neutralize/decrease combat effectiveness of Disparate forces (at end state) | | | | | | |
| | | MOE 1 | Disparate Air combat ineffectiveness | | | | MOP 1, KPP 1 |
| | | | | % Disparate Air Platforms combat ineffective at end state | | | |
| | | MOE 2 | Disparate Infantry combat ineffectiveness | | | | MOP 2, KPP 2 |
| | | | | % Disparate infantry units combat ineffective at end state | | | |
| **MOP Decomposition** | | | | | | | |
| UJTL No. | UJTL Name | MOP Identifier | MOP Description | Data Element | | | |
| OP 3.2.1 | Attack Operational Targets | | | | | | |
| | | MOP1 | Average time to get ordnance on ground target after target assigned | | | | MOE 2, KPP1 |
| | | | | Time target assigned to ordnance on target | | | |
| OP 3.2.1 | Provide Close Air Support Integration for Surface Forces | | | | | | |
| | | MOP 2 | Percentage of air targets correctly identified. | | | | MOE 1, KPP 2 |
| | | | | # targets correctly identified | | | |

**Figure 2: JTEM Notional SV-7 for Test & Evaluation (partial)**

## 2. STRUCTURAL PRESENTATIONS

These diagrams attempt to show how some element of significance to the architecture – from a military command to a single facility to a system, subsystem, or information stream -- is organized.

The following is a generic OV-4, with keys to the types of lines that bind the entities:

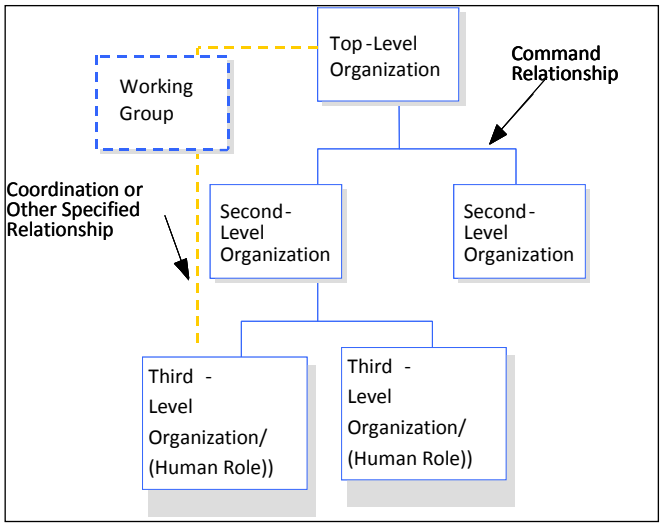


**Figure 3: Generic Organizational Relationship Diagram**

Here is a much more complex Block Diagram, drawn from a real-life DoD program; it concentrates on the logical interfaces between architectural elements. Each interface is labeled with the Work Breakdown Structure (WBS) designator, other document or regulation controlling that interface. They represent agreements between responsible authorities on each side of the interface (consumers and suppliers). Note that the main system architecture (from the point of view of the development team) is depicted at a high level in the middle of the diagram, with its interfacing systems to the right and left. The different colors used each mean something, although the key to colors is not shown here. This diagram has also been dated/versioned by the originators – a desirable feature, but all too rare.

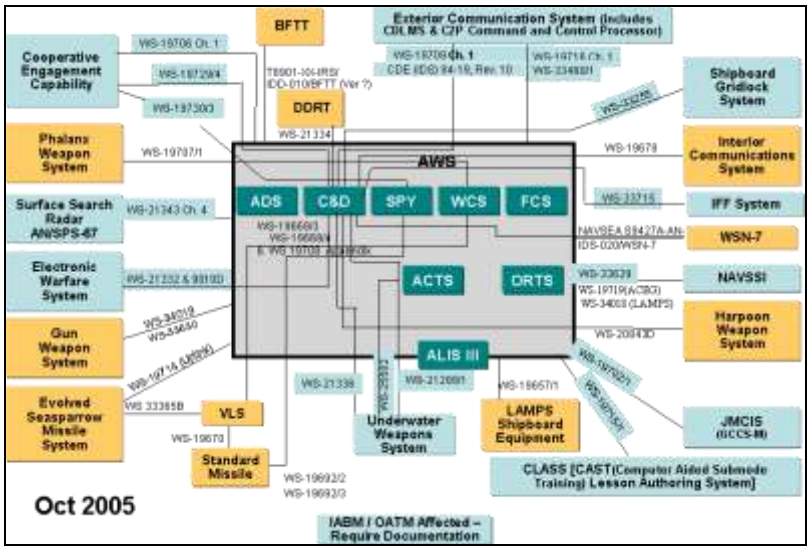


**Figure 4: U.S. Navy Point-to-Point Interface Block Diagram (IDB) for the *Exterior Communication System***

Block diagrams can also show the show of physical quantities/resources (rather than data) from one performing entity to another. They can be used to represent the interfaces supporting the flow of personnel, materiel, or of anything else within a system.

Perhaps the best-know variety of Structural presentation is the Work Breakdown Structure (WBS), an example of which is shown here (for something called the *Autopilot System*):

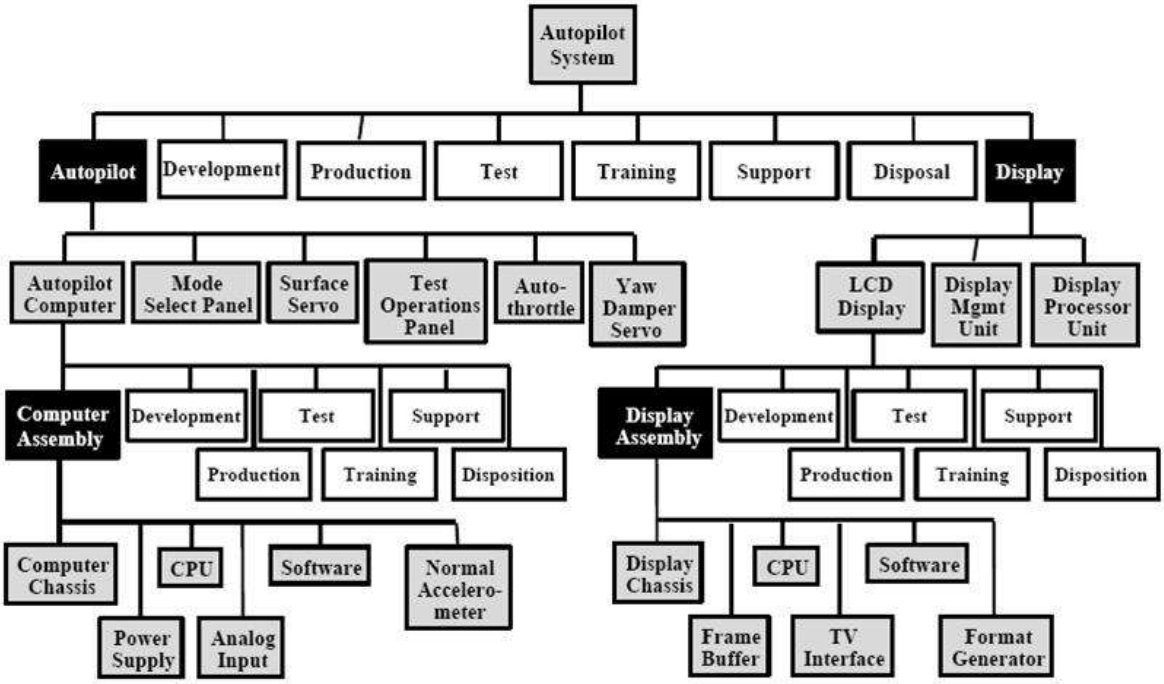


**Figure 5: A Project-Level WBS**

## 3. BEHAVIORAL PRESENTATIONS

These types of diagrams describe the dynamic behaviors of the elements depicted in an architecture. The classic example of the behavioral diagram is perhaps the Operational Event-Trace Description (OV-6c), which shows the logical sequence according to which architectural elements – organizations, systems, or the groups of related functions formerly called "nodes"-- exchange information and/or other resources in order to accomplish an objective. The OV-6c provides a time-ordered examination of the information exchanges between participating entities within the context of a particular scenario.

Each event-trace diagram should be accompanied by a word description of that particular scenario or situation. Operational Event-Trace Descriptions (sometimes called sequence diagrams, scenario charts, or timing diagrams), can be used by itself or in conjunction with an Operational State Transition Description (OV-6b) to describe the dynamic behavior of a process.

An OV-6c is shown below. We've left the entity labels deliberately fuzzy to allow you to concentrate on its layout, instead of the substance:

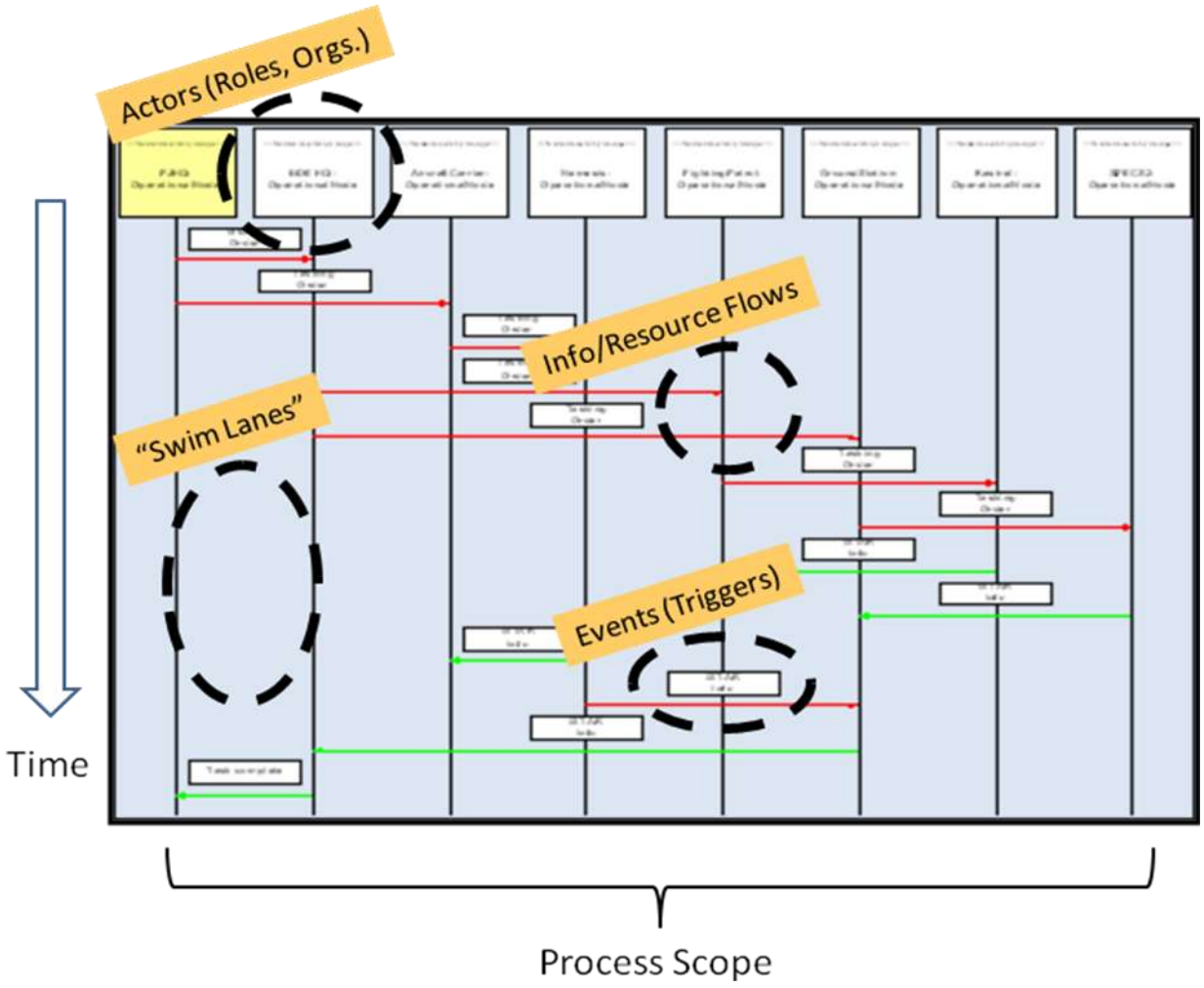


**Figure 6: Layout of the Operational Event-Trace Description (OV-6c)**

The items across the top of the diagram are usually roles or organizations, which take action as triggered by certain types of events. Each role/organization has a vertical timeline associated with it. Specific points in time can be labeled running down the left-hand side of the diagram. Directional arrows between the time lines represent events; the points at which they intersect the timelines represent the times at which the actors "become aware" of the events and can begin to act in response to them. The direction of the event lines represents the flow of control from one organization/role to another.

## 4. MAPPING PRESENTATIONS

Let's face it—if you're an architect, your bosses are always asking you to map one darned thing to another. *Functions* to the *systems* that will carry them out. System *requirements* to the *architectural entities* that will fulfill them. That sort of thing. The purpose of mapping is to help demonstrate that nothing important to an architectural description has been overlooked, and to bring to light relationships of underlap (gaps in functionality) and/or overlap (excess capacity) among the many, many disparate elements which tend to make up a sophisticated architecture.

Figure 6 shows the mapping presentation in its most elementary form – a table consisting of just a few rows and columns. It's the specific intent to map that makes this different than the common Tabular Presentation discussed earlier in this article. The Capability-to-Services Map (CV-7) depicts which services contribute to the achievement of a given capability:

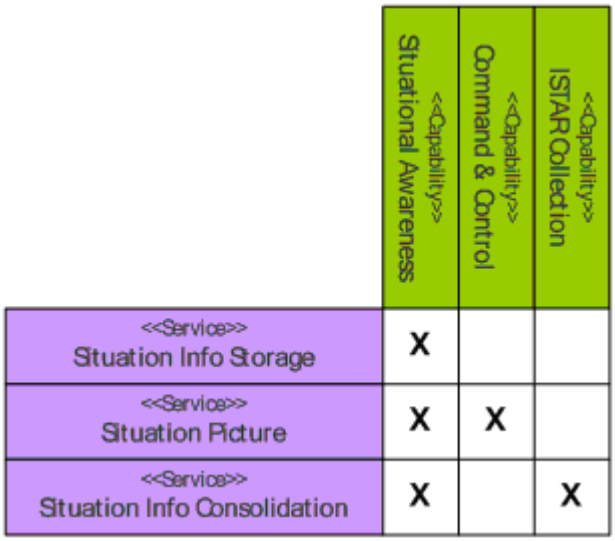


**Figure 7: CV-7 Traces Capabilities to Systems**

## 5. TAXONOMY PRESENTATIONS

Taxonomy is the process of naming – as a noun, the word also means the *result* of the act of naming. A taxonomy usually also shows the *hierarchy* of the things that have been named. Figure 8., below, shows the hierarchy of operational activities characteristic of a given system (with level-labels for each activity), and how those activities begin to flow from the topmost element (labeled A0) to accomplish the system's purpose. The left-hand diagram is an example of an Operational Activity Decomposition Tree (OV-5a) and the right-hand one, an example of an Operational Resource Flow Description (OV-2).

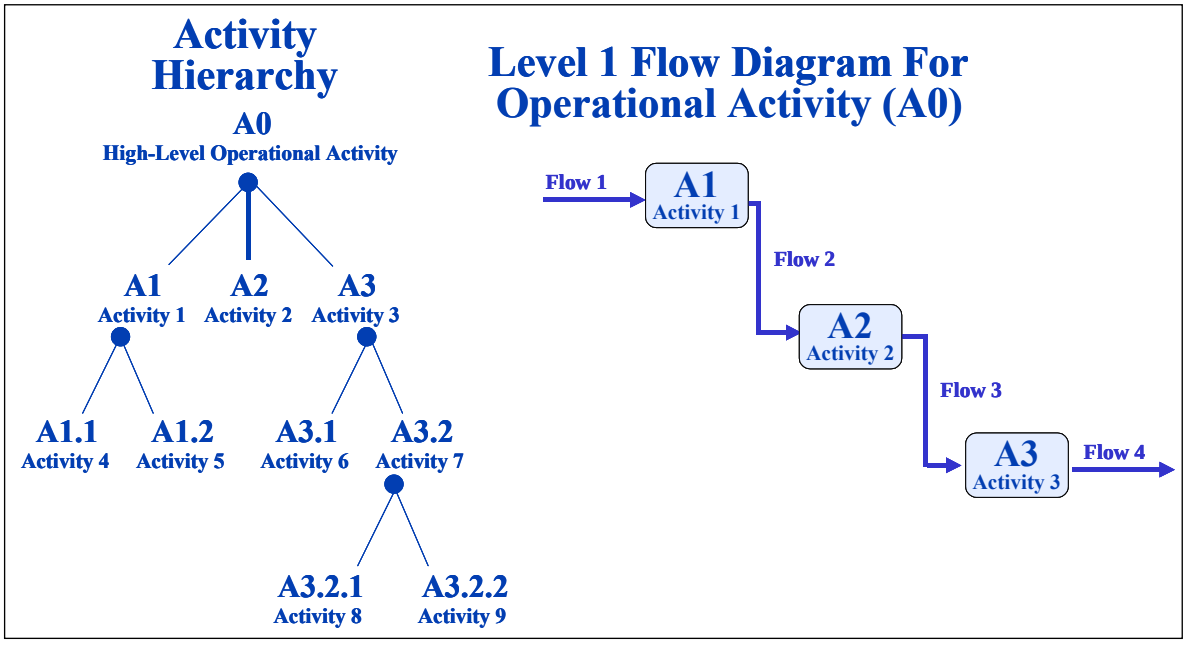


**Figure 8: Taxonomy Hierarchy and Description of High-Level Activity Flow**

## 6. PICTORIAL PRESENTATIONS

Pictorial Presentations are probably the most free-form of the bunch of DoDAF-Described Models. In fact, in their emphasis on providing whatever information decision-makers need to see, they shade close to Fit-for-Purpose Views in the amount of discretion permitted the architect in their construction. In fact, rather than hard-and-fast rules, the best we can do is to provide a couple of examples of classic Pictorial Presentations.

The first example is that of an Operational Concept Graphic (OV-1) depicting the intended operation of a real-life artillery system. The OV-1 provides a graphical depiction of what the architecture is basically about, and an idea of the players and operations involved. It describes a mission, class of mission, or scenario. It shows the main concept of operations (CONOPS) and highlights interesting or unique aspects of the operation. It describes the interactions between the subject architecture and its environment, and between the architecture and external

systems. The OV-1 is the pictorial representation of the content of the *Concepts* paragraph contained in the AV-1.

An OV-1 can be used to orient and focus detailed discussions. Its main use is to aid human communication, and it is intended for presentation to high-level decision-makers.

Graphics alone are not sufficient for capturing the necessary architectural data. Each OV-1 should be accompanied by a brief (3-10 pages) narrative overview of the CONOPS. Unique terms must be captured in the Integrated Data Dictionary (AV-2) and, if necessary, nominated as extensions to the DoDAF Metamodel (DM2).

In the example provided below, note the naturalistic colors and terrain, appropriate to the environment in which this land combat system is expected to operate. Although the OV-1 is sometimes derided as "only a cartoon" (with the implication that it is somehow unworthy to stand side-by-side with "real" architecture artifacts), subject-matter experts (SMEs) and stakeholders can pour for hours over a well-made OV-1, hashing over system scope issues, requirements, and high-level interfaces. The result will be tremendous benefit to the architect's understanding of system utility, role, environment, and general definition.

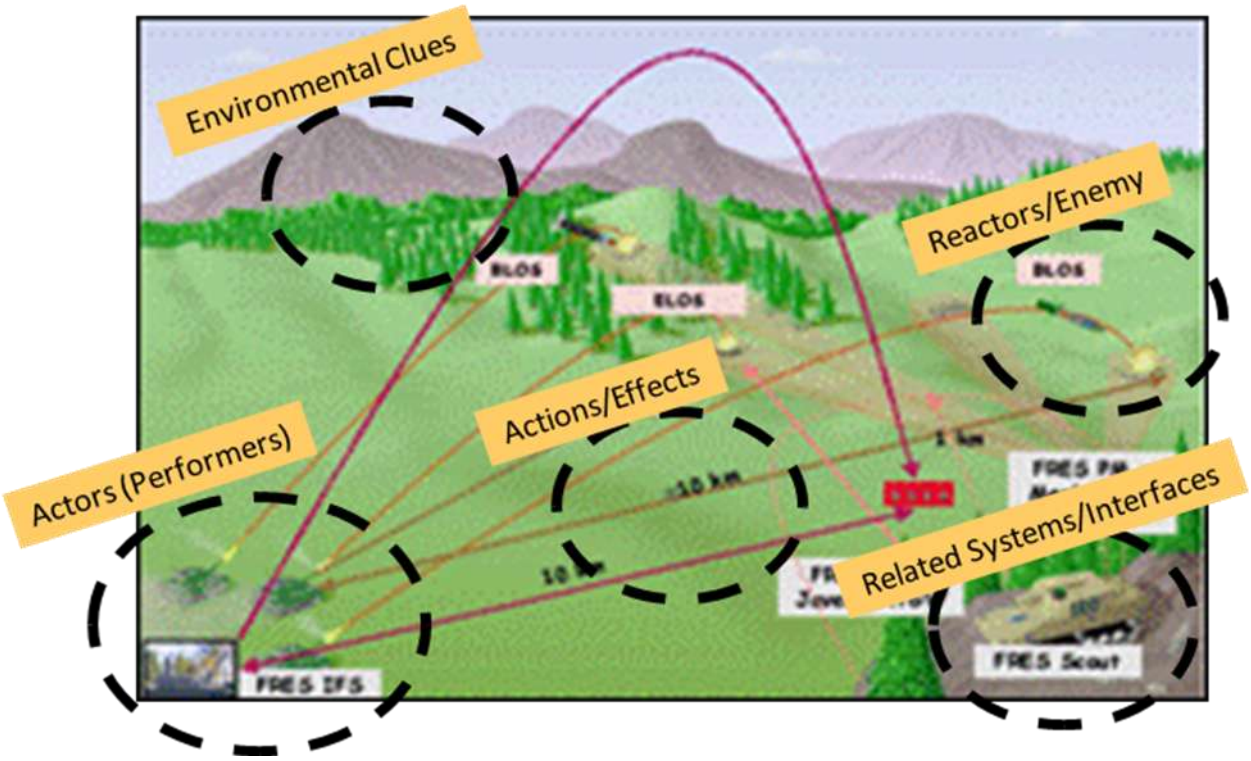


**Figure 9: Operational Concept Graphic (OV-1) Exemplar**

Here's another example of a Pictorial Presentation – this time of the Composite (data fusion) variety. Such presentations incorporate disparate pieces of information that are NOT already captured in one place anywhere within the architecture. This exemplar calls upon four different types of DoDAF-Described Models to convey to a decision-maker the context in which his or her system is being developed. It is, of course, what is *briefed* about the diagram below that will

probably be most important, rather than the architectural data captured by the diagram itself. In this case, the diagram is only a scene-setter:

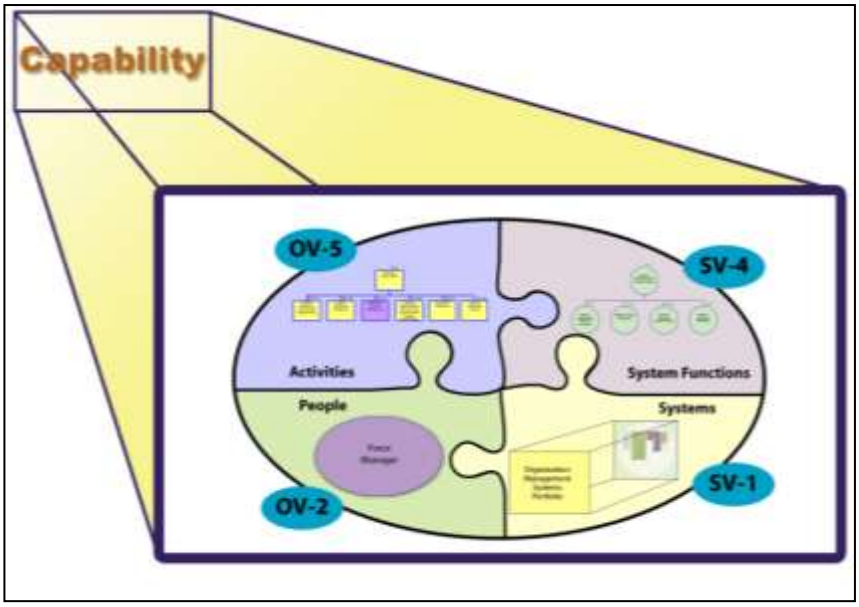


**Figure 10: Composite Overview of System Context**

## 7. TIMELINE PRESENTATIONS

This category of diagrams describes the programmatic aspects of an architecture – e.g. general timelines, capability acquisition milestones, and system evolution. As such, they concentrate on change and "what is happening/who's available" at given points in time. Refer to the following example of a Capability Phasing diagram (CV-3) [which, along with the discussion to follow, we have shamelessly lifted from the MoD UK Architecture Framework (MODAF)]:

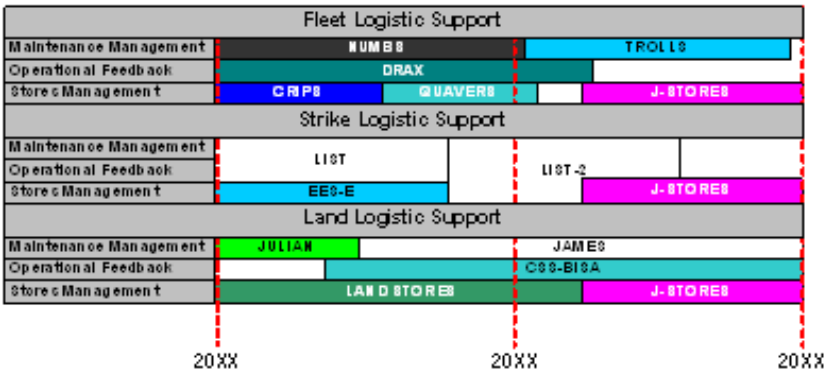


**Figure 11: Capability Phasing (CV-3) DoDAF-Described Model**

The CV-3 addresses the planned achievement of capability at different points in time or during specific periods of time, i.e. capability phasing. The model depicts capability increments, which should be associated with delivery milestones within acquisition projects. It shows the available military capability at different points in time or during specific periods of time.

The CV-3 supports Capability Audits and similar processes used across the different COIs by providing a method to identify gaps or duplication in capability provision. It is a tabular view consisting of rows representing Capabilities (derived from the *Capability Taxonomy* – CV-2) and columns representing program Phases (from the enterprise *Vision* -- CV-1).

At each row-column intersection in the CV-3, the capability increment that represents the change in Capability within that Phase is displayed. If the availability of the Capability spans multiple periods of time then this is indicated by an elongated, color-coded bar. If there are no Capabilities planned to satisfy the capability requirements in that period of time, a blank space appears. See the additional example below:

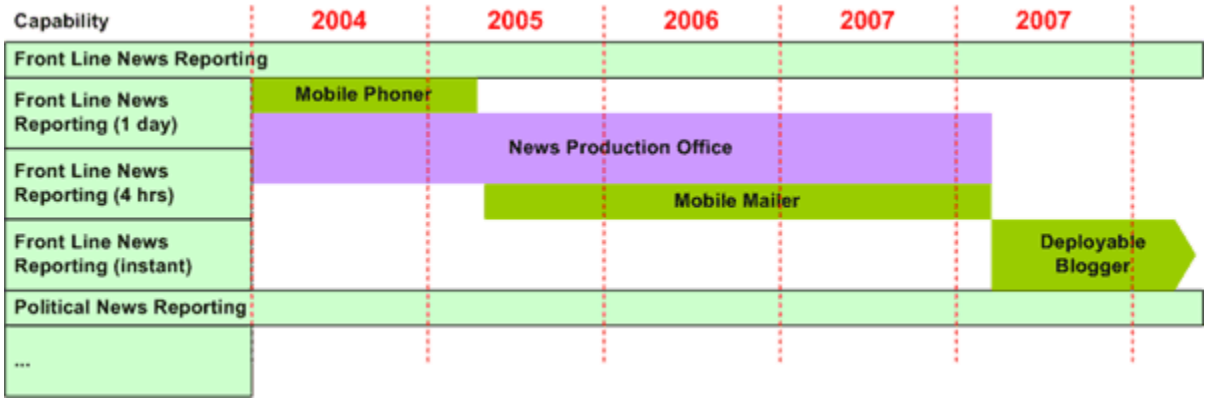


**Figure 12: Example CV-3**

The CV-3 is created by analyzing programmatic project data to determine when elements of military capability are to be delivered, upgraded, cancelled, or withdrawn from service. Then capability increments identified are structured according to the required capabilities determined in the CV-2 and associated enterprise phases. Alternatively, a set of desired capability increments can be modeled and then compared to program plans. In practice, construction of the CV-2 tends to iterate between considerations of the desired capability, on the one hand, and of what capability is planned to be delivered.

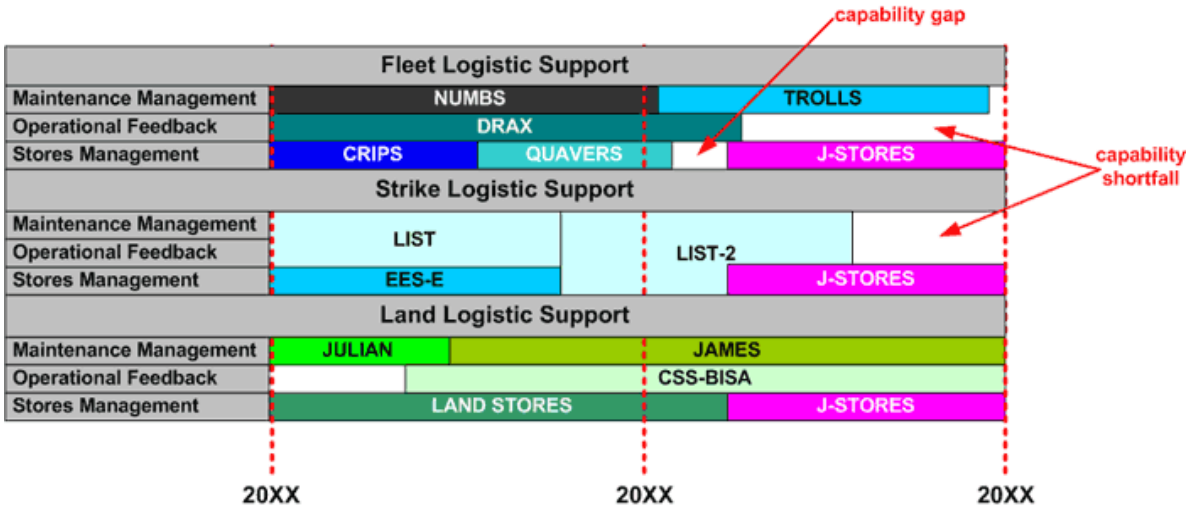


**Figure 13: Variant CV-3**

This is a variant view of the CV-3, concentrating on the relationship between projects, capabilities and time. The view may be used to envisage the need for interventions in projects (to fill a capability gap) or to represent current plans (the availability of capabilities according to their delivery timelines).